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EXAMINER
MCGUTHRY BANKS, TIMA M

ART UNIT	PAPER NUMBER
1742	6

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Please find below and/or attached an Office communication concerning this application or proceeding.

TC-6

Office Action Summary	Application No. 09/857,606	Applicant(s) DAHLBACK ET AL.	
	Examiner Tima M. McGuthry-Banks	Art Unit 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-12 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-12 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Information Disclosure Statement

1. The references cited in the Search Report filed for PCT/SE99/02300 have been considered, but will not be listed on any patent resulting from this application because there were not provided on a separate list in compliance with 37 CFR 1.98(a)(1). In order to have the references printed on such resulting patent, a separate listing, preferably on a PTO-1449 form, must be filed within the set period for reply to this Office action.

Specification

2. Since this national stage application does not have the abstract as a separate page of the specification, the abstract from the front sheet of the publication will be used at issuance.

Claim Objections

3. Claims 1-12 are objected to because of the following informalities:

   a) Applicants should use American English in the claims, for instance "characterized".

   b) In Claim 1, the phrase "for zirconium of a reactor quality normal contents of impurities" is not clear. The examiner will interpret this part of the preamble to

read on a zirconium-based alloy that has a quality and impurity level suitable for reactors.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

6. Claims 1, 2, and 4-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Isobe et al (US 6,125,161).

7. Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Isobe anticipates the invention substantially as claimed. Isobe teaches a zirconium alloy. The alloy contains the following by weight: 0.05-1.0% Nb, 0.18-0.6% Fe, and 0.2-1.7% Sn (see abstract). The anticipated ranges for Nb, Fe, and Sn are 0.5-1.0%, 0.3-0.6%, and 0.5-0.86%, respectively. Regarding Claim 2, the anticipated range of Sn is up to 0.86%. Regarding Claim 4, the alloy includes 0.07 to 0.4% Cr by weight. Regarding Claim 5, the maximum and anticipated total content of Nb and Sn is 1.86%. Regarding Claims 6-10, the alloy is for nuclear reactor fuel cladding (abstract).

8. Claims 1 and 5-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Mardon et al (US 5,940,464).

Mardon anticipates the invention substantially as claimed. Mardon teaches a zirconium alloy that contains the following composition by weight: 0.8-1.8% Nb, 0.02-0.4% Fe, and 0.2-0.6% Sn (see abstract). The anticipated ranges for Nb, Fe, and Sn are 0.8-1.6, 0.3-0.4, and 0.5-0.6, respectively. Regarding Claim 5, the maximum and anticipated total content of Nb and Sn is 2.2%. Regarding Claims 6-10, the alloy is for a nuclear fuel pencil housing or a nuclear fuel assembly guide tube (abstract).

9. Claims 1, 2, and 4-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Jeong et al (US 5,985,211).

Jeong anticipates the invention substantially as claimed. Jeong teaches a zirconium alloy containing the following composition by weight: 0.3-0.6% Nb, 0.2-0.5% Fe, and 0.7-1.0% Sn (Claim 5). The anticipated ranges for Nb, Fe, and Sn are 0.5-0.6%, 0.3-0.5%, and 0.7-0.86%,

respectively. Regarding Claim 2, the anticipated range of Sn is up to 0.86%. Regarding Claim 4, the alloy contains 0.05-0.25% Cr (*ibid*). Regarding Claim 5, the maximum and anticipated content of Nb and Sn is 1.46%. Regarding Claims 6-10, the alloy is used for fuel claddings (column 1, line 10).

10. Claims 1, 2, and 4-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Garde et al (US 5,211,774).

Garde '774 anticipates the invention substantially as claimed. Garde '774 teaches a zirconium alloy containing the following composition by weight: up to 0.6% Nb, 0.2-0.5% Fe, and 0.8-1.2% Sn (see abstract). The anticipated ranges for Nb, Fe, and Sn are 0.5-0.6%, 0.3-0.5%, and 0.8-0.86, respectively. Regarding Claim 2, the anticipated range of Sn is up to 0.86%. Claim 4, amount of Cr is 0.1-0.4% (abstract). Regarding Claim 5, the maximum and anticipated content of Nb and Sn is 1.46%. Regarding Claims 6-10, the alloy is sued for fuel cladding (column 1, line 8).

11. Claims 1-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Nomoto et al (JP 08067954 A).

Nomoto anticipates the invention substantially as claimed. Nomoto teaches a zirconium alloy containing the following composition by weight: 0-1% Nb, 0.25-0.75% Fe, and 0.4-1.7% Sn (abstract). The anticipated ranges for Nb, Fe, and Sn are 0.5-1%, 0.3-0.6%, and 0.5-0.86, respectively. Regarding Claim 2, the maximum anticipated content of Sn is 0.86%. Regarding Claim 3, the alloy contains 0-0.1% Ni (*ibid*). Regarding Claim 4, the alloy contains 0.05-0.3%

Cr. Regarding Claim 5, the maximum and anticipated content of Nb and Sn is 1.86%. Regarding Claims 6-9, the alloy is used for the nuclear fuel-covering spool of a nuclear power plant (paragraph 6 of machine translation).

12. Claims 1-6 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Anada et al (JP 02159336 A).

Anada anticipates the invention substantially as claimed. Anada teaches a zirconium alloy containing the following composition by weight: 0.05-1.5% Nb, 0.05-0.5% Fe, and 0.2-1.7% Sn (abstract). The anticipated ranges for Nb, Fe, and Sn are 0.5-1.5%, 0.3-0.5, and 0.5-0.86, respectively. Regarding Claim 2, the maximum anticipated content of Sn is 0.86%. Regarding Claim 3, the alloy contains 0.01-0.1% Ni (*ibid*). Regarding Claim 4, the alloy contains 0.05-0.3% Cr (*ibid*). Regarding Claim 5, the maximum and anticipated content of Nb and Sn is 2.36%. Regarding Claims 6-8, the alloy is used for the nuclear fuel-covering spool of a nuclear power plant.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 1, 2, and 4-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isobe.

Isobe discloses the invention substantially as claimed. However, Isobe does not specifically disclose the entire ranges of Nb, Fe, and Sn as claimed in Claim 1. Where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). See MPEP § 2144.05.

15. Claims 1 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mardon.

Mardon discloses the invention substantially as claimed. However, Mardon does not specifically disclose the entire ranges of Nb, Fe, and Sn as claimed in Claim 1. Where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). See MPEP § 2144.05.

16. Claims 1, 2, and 4-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong.

Jeong discloses the invention substantially as claimed. However, Jeong does not specifically disclose the entire ranges of Nb, Fe, and Sn as claimed in Claim 1. Where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of

obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). See MPEP § 2144.05.

17. Claims 1, 2, and 4-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garde '774.

Garde '774 discloses the invention substantially as claimed. However, Garde '774 does not specifically disclose the entire ranges of Nb, Fe, and Sn as claimed in Claim 1. Where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). See MPEP § 2144.05.

18. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomoto.

Nomoto discloses the invention substantially as claimed. However, Nomoto does not specifically disclose the entire ranges of Nb, Fe, and Sn as claimed in Claim 1. Where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). See MPEP § 2144.05.

19. Claims 1-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anada.

Anada discloses the invention substantially as claimed. However, Anada does not specifically disclose the entire ranges of Nb, Fe, and Sn as claimed in Claim 1. Where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of

obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). See MPEP § 2144.05.

20. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Isobe as applied to Claim 1 above, and further in view of Garde et al (US 5,254,308).

Isobe discloses the invention substantially as claimed. However, Isobe does not teach that the alloy contains nickel as in Claim 3. Garde '308 teaches a zirconium alloy used in the fuel assembly structure components of nuclear reactors (column 1, lines 17-19). The alloy contains tin, iron, chromium, niobium, and nickel (columns 3 and 4). The amount of nickel is 0.012-0.03 wt. % (column 4, line 5). It would have been obvious to one with ordinary skill in the art at the time the invention was made that the alloy in Isobe would contain nickel, since nickel enhances the high temperature corrosion resistance of the zirconium alloy (Garde '308, column 4, lines 6 and 7).

21. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mardon as applied to Claim 1 above, and further in view of Garde '308.

Mardon discloses the invention substantially as claimed. However, Mardon does not teach that the alloy contains nickel as in Claim 3 or chromium as in Claim 4. Garde '308 teaches a zirconium alloy used in the fuel assembly structure components of nuclear reactors (column 1, lines 17-19). The alloy contains tin, iron, chromium, niobium, and nickel (columns 3 and 4). The amount of nickel is 0.012-0.03 wt. % (column 4, line 5) and the amount of chromium is 0.2-0.3 wt. % (column 3, lines53 and 54). Regarding nickel, it would have been obvious to one with

ordinary skill in the art at the time the invention was made that the alloy in Mardon would contain nickel, since nickel enhances the high temperature corrosion resistance of the zirconium alloy (Garde '308, column 4, lines 6 and 7). Regarding chromium, it would have been obvious to one with ordinary skill in the art at the time the invention was made that the alloy in Mardon would contain chromium, since chromium is added to improve the strength and creep resistance of the alloy (Garde '308, column 3, lines 45 and 46).

22. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong as applied to Claim 1 above, and further in view of Garde '308.

Jeong discloses the invention substantially as claimed. However, Jeong does not teach that the alloy contains nickel as in Claim 3. Garde '308 teaches a zirconium alloy used in the fuel assembly structure components of nuclear reactors (column 1, lines 17-19). The alloy contains tin, iron, chromium, niobium, and nickel (columns 3 and 4). The amount of nickel is 0.012-0.03 wt. % (column 4, line 5). It would have been obvious to one with ordinary skill in the art at the time the invention was made that the alloy in Jeong would contain nickel, since nickel enhances the high temperature corrosion resistance of the zirconium alloy (Garde '308, column 4, lines 6 and 7).

23. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Garde '774 as applied to Claim 1 above, and further in view of Garde '308.

Garde '774 discloses the invention substantially as claimed. However, Garde '774 does not teach that the alloy contains nickel as in Claim 3. Garde '308 teaches a zirconium alloy used

in the fuel assembly structure components of nuclear reactors (column 1, lines 17-19). The alloy contains tin, iron, chromium, niobium, and nickel (columns 3 and 4). The amount of nickel is 0.012-0.03 wt. % (column 4, line 5). It would have been obvious to one with ordinary skill in the art at the time the invention was made that the alloy in Garde '774 would contain nickel, since nickel enhances the high temperature corrosion resistance of the zirconium alloy (Garde '308, column 4, lines 6 and 7).

24. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nomoto as applied to Claims 1 and 8 above, and further in view of Garde '308.

Nomoto discloses the invention substantially as claimed. However, Nomoto does not specifically disclose that the alloy is used for a cladding tube for nuclear fuel as claimed. It would have been obvious to one with ordinary skill in the art at the time the invention was made that the zirconium alloy taught by Nomoto could be used as for a cladding tube, since it is well known that zirconium alloys can be used in the fuel assembly structural components of nuclear reactors, such as in fuel rod cladding (Garde '308, column 1, lines 17-19).

25. Claims 7, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anada as applied to Claims 1, 6, and 8 above, and further in view of Garde '308.

Anada discloses the invention substantially as claimed. Though Anada teaches that the alloy is used in nuclear reactors, Anada does not specifically claim that the alloy constitutes part of a fuel assembly as claimed. It would have been obvious to one with ordinary skill in the art at the time the invention was made that the zirconium alloy taught in Anada could be used as part

of a fuel assembly, since it is well known that zirconium alloys can be used in the fuel assembly structural components of nuclear reactors, such as in fuel rod cladding (Garde '308, column 1, lines 17-19).

26. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Isobe as applied to Claims 1, 8, and 10 above, and further in view of Garde '308 and in view of Van Swam (US 5,790,623).

Isobe discloses the invention substantially as claimed. However, Isobe does not specifically teach the specification of the alloy component as claimed in Claims 11 and 12. Van Swam teaches a high strength cladding tube for nuclear fuel for a water-cooled and or moderated nuclear reactor comprising an elongated hollow metallic tubular cladding for containing a nuclear fuel. The tubular cladding comprises an outer tubular layer, which is formed of zirconium alloy, having an outer wall and an inner wall. The tubular cladding further includes an innermost layer bonded to an inner wall of the inner layer, wherein the innermost layer is formed of a metal selected from the group consisting of zirconium and a zirconium alloy (Claims 1-7). Garde '308 teaches that alloying elements in zirconium alloys improve strength[1] (column 4, lines 41 and 42). It would have been obvious to one with ordinary skill in the art at the time the invention was made that the innermost layer would be more ductile[2] than the zirconium alloy of Isobe, since unalloyed zirconium would have less strength, which relates to more ductility. It

[1] Strength: The power to resist strain or stress; durability. 1987-1996 Microsoft Corporation. All rights reserved. *The Columbia Dictionary of Quotations* is licensed from Columbia University Press. Copyright © 1993, 1995 by Columbia University Press. All rights reserved.

is well known in the art that fuel rod cladding has at least two layers of tubing (Van Swam, column 2, line 24).

27. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mardon as applied to Claims 1, 8, and 10 above, and further in view of Garde '308 and in view of Van Swam.

Mardon discloses the invention substantially as claimed. However, Mardon does not specifically teach the specification of the alloy component as claimed in Claims 11 and 12. Van Swam teaches a high strength cladding tube for nuclear fuel for a water-cooled and or moderated nuclear reactor comprising an elongated hollow metallic tubular cladding for containing a nuclear fuel. The tubular cladding comprises an outer tubular layer, which is formed of zirconium alloy, having an outer wall and an inner wall. The tubular cladding further includes an innermost layer bonded to an inner wall of the inner layer, wherein the innermost layer is formed of a metal selected from the group consisting of zirconium and a zirconium alloy (Claims 1-7). Garde '308 teaches that alloying elements in zirconium alloys improve strength (column 4, lines 41 and 42). It would have been obvious to one with ordinary skill in the art at the time the invention was made that the innermost layer would be more ductile than the zirconium alloy of Mardon, since unalloyed zirconium would have less strength, which relates to more ductility. It is well known in the art that fuel rod cladding has at least two layers of tubing (Van Swam, column 2, line 24).

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[2] Ductility: Easily molded or shaped. *Ibid.*

28. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong as applied to Claims 1, 8, and 10 above, and further in view of Garde '308 and in view of Van Swam.

Jeong discloses the invention substantially as claimed. However, Jeong does not specifically teach the specification of the alloy component as claimed in Claims 11 and 12. Van Swam teaches a high strength cladding tube for nuclear fuel for a water-cooled and or moderated nuclear reactor comprising an elongated hollow metallic tubular cladding for containing a nuclear fuel. The tubular cladding comprises an outer tubular layer, which is formed of zirconium alloy, having an outer wall and an inner wall. The tubular cladding further includes an innermost layer bonded to an inner wall of the inner layer, wherein the innermost layer is formed of a metal selected from the group consisting of zirconium and a zirconium alloy (Claims 1-7). Garde '308 teaches that alloying elements in zirconium alloys improve strength (column 4, lines 41 and 42). It would have been obvious to one with ordinary skill in the art at the time the invention was made that the innermost layer would be more ductile than the zirconium alloy of Jeong, since unalloyed zirconium would have less strength, which relates to more ductility. It is well known in the art that fuel rod cladding has at least two layers of tubing (Van Swam, column 2, line 24).

29. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Garde '774 as applied to Claims 1, 8, and 10 above, and further in view of Garde '308 and in view of Van Swam.

Garde '774 discloses the invention substantially as claimed. However, Garde '774 does not specifically teach the specification of the alloy component as claimed in Claims 11 and 12. Van Swam teaches a high strength cladding tube for nuclear fuel for a water-cooled and or moderated nuclear reactor comprising an elongated hollow metallic tubular cladding for containing a nuclear fuel. The tubular cladding comprises an outer tubular layer, which is formed of zirconium alloy, having an outer wall and an inner wall. The tubular cladding further includes an innermost layer bonded to an inner wall of the inner layer, wherein the innermost layer is formed of a metal selected from the group consisting of zirconium and a zirconium alloy (Claims 1-7). Garde '308 teaches that alloying elements in zirconium alloys improve strength (column 4, lines 41 and 42). It would have been obvious to one with ordinary skill in the art at the time the invention was made that the innermost layer would be more ductile than the zirconium alloy of Garde '774, since unalloyed zirconium would have less strength, which relates to more ductility. It is well known in the art that fuel rod cladding has at least two layers of tubing (Van Swam, column 2, line 24).

30. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nomoto in view of Garde '308 as applied to Claims 1, 8, and 10 above, and further in view of Van Swam.

Nomoto in view of Garde '308 discloses the invention substantially as claimed. However, Nomoto in view of Garde '308 does not specifically teach the specification of the alloy component as claimed in Claims 11 and 12. Van Swam teaches a high strength cladding tube for nuclear fuel for a water-cooled and or moderated nuclear reactor comprising an elongated hollow

metallic tubular cladding for containing a nuclear fuel. The tubular cladding comprises an outer tubular layer, which is formed of zirconium alloy, having an outer wall and an inner wall. The tubular cladding further includes an innermost layer bonded to an inner wall of the inner layer, wherein the innermost layer is formed of a metal selected from the group consisting of zirconium and a zirconium alloy (Claims 1-7). It would have been obvious to one with ordinary skill in the art at the time the invention was made that the innermost layer would be more ductile than the zirconium alloy of Nomoto in view of Garde '308, since alloying elements in zirconium alloys improve strength (Garde '308, column 4, lines 41 and 42). Unalloyed zirconium has less strength, which relates to more ductility. It is well known in the art that fuel rod cladding has at least two layers of tubing (Van Swam, column 2, line 24).

31. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anada in view of Garde '308 as applied to Claims 1, 8, and 10 above, and further in view of Van Swam.

Anada in view of Garde '308 discloses the invention substantially as claimed. However, Anada in view of Garde '308 does not specifically teach the specification of the alloy component as claimed in Claims 11 and 12. Van Swam teaches a high strength cladding tube for nuclear fuel for a water-cooled and or moderated nuclear reactor comprising an elongated hollow metallic tubular cladding for containing a nuclear fuel. The tubular cladding comprises an outer tubular layer, which is formed of zirconium alloy, having an outer wall and an inner wall. The tubular cladding further includes an innermost layer bonded to an inner wall of the inner layer, wherein the innermost layer is formed of a metal selected from the group consisting of zirconium

and a zirconium alloy (Claims 1-7). It would have been obvious to one with ordinary skill in the art at the time the invention was made that the innermost layer would be more ductile than the zirconium alloy of Anada in view of Garde '308, since alloying elements in zirconium alloys improve strength (Garde '308, column 4, lines 41 and 42). Unalloyed zirconium has less strength, which relates to more ductility. It is well known in the art that fuel rod cladding has at least two layers of tubing (Van Swam, column 2, line 24).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tima M. McGuthry-Banks, whose telephone number is 703-308-1917. The examiner can normally be reached on 9:30-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King, can be reached on 703-308-1146. The fax numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist, whose telephone number is 703-308-0651.

Tima M. McGuthry-Banks
Examiner
Art Unit 1742

May 10, 2002